

WHAT IS CLAIMED IS:

1. An optical film comprising:

a polarizing plate; and

5 a brightness enhancement film;

wherein a maximum chromaticity difference  $\Delta_{xy}(\max)$  of in-plane transmitted light of the optical film is about 0.008 or smaller after the optical film is attached to a glass plate and allowed to stand at 70°C for 120 hours.

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2. The optical film according to claim 1, wherein the brightness enhancement film comprises a layer having a circularly polarized light separating function, and a quarter wavelength plate.

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3. The optical film according to claim 2, wherein an in-plane retardation ( $\Delta_{nd}$ ) with respect to incident light from a normal direction of the quarter wavelength plate satisfies

$$\Delta_{nd}(450 \text{ nm}) / \Delta_{nd}(550 \text{ nm}) \leq 1.02,$$

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where  $\Delta_{nd}$  is  $(n_x - n_y) \cdot d$ ,  $n_x$  and  $n_y$  respectively represent

refractive indices in an X-axis direction and a Y-axis direction in the quarter wavelength plate, with the X-axis direction being an axial direction exhibiting a maximum refractive index within a plane of the quarter wavelength plate and the Y-axis direction being an axial direction perpendicular to the X axis within the plane,  $d$  represents a thickness of the quarter wavelength plate,  $\Delta_{nd}(450 \text{ nm})$  represents an in-plane retardation at a wavelength of 450 nm, and  $\Delta_{nd}(550 \text{ nm})$  represents an in-plane retardation at a wavelength of 550 nm.

4. The optical film according to claim 2, wherein an in-plane

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retardation ( $\Delta_{nd}'$ ) with respect to incident light from a direction inclined by 45° from a normal direction of the quarter wavelength plate satisfies

$$\Delta_{nd}'(450 \text{ nm}) / \Delta_{nd}'(550 \text{ nm}) \leq 1.04,$$

where  $\Delta_{nd}'$  is  $(n_x' - n_y') \cdot d$ ,  $n_x'$  and  $n_y'$  respectively represent refractive indices in an X'-axis direction and a Y'-axis direction with respect to the incident light from the direction inclined by 45° from the normal direction (a Z'-axis direction) of the quarter wavelength plate, with the X'-axis direction being an axial direction within a plane of the quarter

wavelength plate perpendicular to an incident direction of the incident light inclined by 45° from the Z'-axis direction and the Y'-axis direction being a direction perpendicular to the incident direction and the X'-axis direction, d represents a thickness of the quarter wavelength plate,  $\Delta nd'(450 \text{ nm})$

5 represents an in-plane retardation at a wavelength of 450 nm, and  $\Delta nd'(550 \text{ nm})$  represents an in-plane retardation at a wavelength of 550 nm.

5. The optical film according to claim 2, wherein the quarter wavelength plate comprises

10 a retardation film satisfying  $nx^r > ny^r = nz^r$ , and  
a liquid crystal layer satisfying  $nz^c > nx^c \geq ny^c$ ,  
where "nx<sup>r</sup>, ny<sup>r</sup>, nz<sup>r</sup>" and "nx<sup>c</sup>, ny<sup>c</sup>, nz<sup>c</sup>" indicate refractive indices in an X-axis direction, a Y-axis direction and a Z-axis direction in the retardation film and the liquid crystal layer, respectively, with the X-axis direction being an axial direction exhibiting a maximum refractive index within a plane of the retardation film or the liquid crystal layer, the Y-axis direction being an axial direction perpendicular to the X axis within the plane and the Z-axis direction being a thickness direction perpendicular to the X axis and the Y axis.

15 20 6. The optical film according to claim 2, wherein the quarter wavelength plate is a film comprising a polymer having a photoelastic coefficient of  $40 \times 10^{-12} \text{ m}^2/\text{N}$  or smaller.

25 7. The optical film according to claim 6, wherein the quarter wavelength plate is a liquid crystal layer comprising a nematic liquid crystal.

30 8. The optical film according to claim 2, wherein constituent molecules of the layer having the circularly polarized light separating function are oriented in such a manner as to have a cholesteric structure.

35 9. The optical film according to claim 8, wherein the layer having the circularly polarized light separating function is a cholesteric liquid crystal layer.

10. The optical film according to claim 1, wherein the polarizing plate

and the brightness enhancement film are laminated via a pressure sensitive adhesive or an adhesive.

11. The optical film according to claim 1, having a diagonal length of 250  
5 mm or larger.

12. The optical film according to claim 1, wherein the  $\Delta_{xy}(\max)$  is 0.005 or smaller.

10 13. The optical film according to claim 1, wherein the  $\Delta_{xy}(\max)$  is 0.003 or smaller.

14. A liquid crystal display comprising:  
the optical film according to claim 1; and  
15 a liquid crystal cell;  
wherein the optical film is disposed on at least one surface of the liquid crystal cell.

20 15. An image display apparatus comprising the optical film according to  
claim 1.

16. A quarter wavelength plate, to be used in a brightness enhancement film, wherein an in-plane retardation ( $\Delta_{nd}$ ) with respect to incident light from a normal direction of the quarter wavelength plate satisfies

25  $\Delta_{nd}(450 \text{ nm}) / \Delta_{nd}(550 \text{ nm}) \leq 1.02$ ,  
where  $\Delta_{nd}$  is  $(n_x - n_y) \cdot d$ ,  $n_x$  and  $n_y$  respectively represent refractive indices in an X-axis direction and a Y-axis direction in the quarter wavelength plate, with the X-axis direction being an axial direction exhibiting a maximum refractive index within a plane of the quarter  
30 wavelength plate and the Y-axis direction being an axial direction perpendicular to the X axis within the plane,  $d$  represents a thickness of the quarter wavelength plate,  $\Delta_{nd}(450 \text{ nm})$  represents an in-plane retardation at a wavelength of 450 nm, and  $\Delta_{nd}(550 \text{ nm})$  represents an in-plane retardation at a wavelength of 550 nm.

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17. A quarter wavelength plate, to be used in a brightness enhancement film, wherein the quarter wavelength plate is a film comprising a polymer

having a photoelastic coefficient of  $40 \times 10^{-12} \text{ m}^2/\text{N}$  or smaller.